

RESEARCH ARTICLE

An analysis method: Artistic value inheritance of *Silk Road Flower Rain*Manyu Dou^{1*} Ho Sang Shin¹¹ Seoul School of Integrated Sciences and Technologies (aSSIST University), Seoul, South Korea

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Abstract: This paper investigates development of Dunhuang music and dance drama *Silk Road Flower Rain*, highlighting its significance in promoting Dunhuang culture. It examines the artistic innovation and cultural connotations that influence the artistic value of the work. Through quantitative methods such as surveys and respondents evaluations, the study assesses various indicators of artistic value, including music composition, artistic innovation, emotional expression, and cultural depth. The findings reveal that the overall artistic value scores of *Silk Road Flower Rain* is 3.407 out of 5, indicating a high level of artistic quality. Key factors affecting this value include music composition, artistic innovation, and cultural connotation. The study emphasizes the importance of balancing traditional artistic characteristics with modern innovations to enhance the work's appeal to contemporary audiences. In conclusion, *Silk Road Flower Rain* serves as a significant cultural emblem of Chinese music and dance, contributing to international cultural exchanges and enhancing the global influence of Chinese arts. The research provides insights into the preservation and development of Dunhuang performing arts, emphasizing the need for continuous innovation while respecting traditional roots.

Keywords: *Silk Road Flower Rain*, Dunhuang performing arts, artistic value, cultural connotations, artistic innovation, music and dance integration

1 Introduction

With the acceleration of globalization, cultural exchanges between countries have become increasingly frequent, and art education plays a significant role in international exchanges. As an important component of China's excellent traditional culture, Dunhuang performing arts hold unique value in terms of inheritance and development. Dunhuang performing arts, with their distinctive artistic charm and profound cultural connotations, have attracted numerous audiences both domestically and internationally, becoming a bridge for cultural exchange.

From the perspective of artistic creation and practice, on December 1, 1917, during the daytime, Mei Lanfang performed "Tian Nu San Hua" (Heavenly Maiden Scattering Flowers) for the first time at Beijing Jixiang Garden. It was the first attempt in the history of Peking Opera to bring the imagery of the Flying Apsaras from the Mogao Caves in Dunhuang onto the stage. The stage featured vibrant and colorful silk dances, and the performance created a sensation (Bi, 2022). In 1954, Dai Ailian created the duet performing art "Flying Apsaras," which was the first contemporary Chinese performing art piece based on Dunhuang murals. She pursued not merely the imitation of Dunhuang murals but aimed to express a celestial artistic conception soaring through the heavens with flowing, gliding, and leaping movements of silk ribbons—embodying human hopes and aspirations (Shan, 2019). In 1979, the Gansu Provincial Song and Dance Troupe used the mural art of Dunhuang Mogao Grottoes to condense the typical dance posture and rebound the image of the pipa (playing the pipa behind the back) (Zhao, 1980). It innovated and developed the music and dance of the Central Plains (China) and the Western Regions in the Tang Dynasty. The large-scale music and dance drama *Silk Road Flower Rain* was successfully performed at home and abroad. "Flying Apsaras" has flown out of Dunhuang and gone to the world. It is a successful work of Dunhuang music and dance and has become a landmark work. *Silk Road Flower Rain* is a music and dance drama with Dunhuang murals as the background, telling the experience of the protagonist Yingniang and her father Shengbi Zhang. Yingniang studied painting with her father since childhood, and she used a magical brush to depict the magnificent world of Dunhuang murals. However, Yingniang's father was victimized by evil forces, and Yingniang had to embark on a difficult road to in the process, she met the Persian merchant Inus, and the two went through various hardships together. In the end, Yingniang, with wisdom and courage, successfully rescued her father and showed the wonderful world of

Dunhuang murals to the world. The play shows the unique charm of Dunhuang murals through dance, while also conveying friendship and peace on the Silk Road (Baidu Baike, 2024).

After the success of *Silk Road Flower Rain* in 1979, it can be considered a historically significant event, sparking a research boom among domestic and international scholars on Dunhuang music and dance and yielding numerous research results (Dong, 1979; Ye, 1982, 1985; Xi, 1983, 1992a, 1992b; Zhuang, 1984, 2002; Niu, 1991; Zheng, 1997, 2002; Gao, 2000, 2002, 2008; Wang & Chai, 2007; He, 2007, 2008, 2009; Wang, 2019; Shi, 2023). Artists and scholars in China's educational circles keenly realized that a unique dance school was about to form in Gansu Province. A dance school not only requires repertoire but also its own teaching system, dance textbooks, talent cultivation, and stage productions—all of which are indispensable (Gao, 2002; He, 2009). Research on Dunhuang cave music and dance involves various fields such as music, dance, costumes, iconography, and painting. It requires in-depth and comprehensive studies of Dunhuang murals, musical scores in scriptures, and other aspects from perspectives like cave archaeology, historical documents, and musical archaeology. This interdisciplinary approach aims to cultivate comprehensive talents who can fully showcase the origins, evolution, and historical trajectory of Chinese national art through Dunhuang murals and musical scriptures, presenting Chinese art history to the world from a new and complete dimension.

According to reports by Wang (2023) and Ding (2024), *Silk Road Flower Rain*, as a representative work of Dunhuang performing arts, has been performed nearly 4,000 times domestically and internationally since its premiere in 1979, attracting over 5 million audiences. It is hailed as a “model of Chinese national dance drama.” The play, set against the backdrop of the Silk Road, recreates the magnificent scenes of friendly exchanges among people from various countries along the ancient Silk Road through the integration of dance, music, drama, and other art forms, showcasing the unique charm of Dunhuang culture. However, in the modern education system, the inheritance and development of Dunhuang performing arts face numerous challenges. How to maintain the characteristics of traditional art while adapting to the developmental needs of modern education has become an urgent issue to be addressed.

With the acceleration of globalization, cultural exchanges have become increasingly frequent, and art education plays a significant role in these interactions. As a vital part of China's traditional culture, Dunhuang performing arts possess unique artistic charm and profound cultural connotations, making them a bridge for cultural exchange. This paper analyzes the artistic value and inheritance of the Dunhuang music and dance drama *Silk Road Flower Rain* by quantitative methods such as surveys and respondents evaluations.

2 Research hypothesis

Hypothesis: Artistic Innovation and Cultural Connotations Influence the Artistic Value in the Inheritance and Development of *Silk Road Flower Rain*.

The theory of artistic inheritance and innovation holds that the vitality of art lies in continuous inheritance and innovation. Only by deeply understanding and inheriting traditional art and infusing it with new forms and content through innovation can art endure and develop. Cultural connotations refer to the deeper elements of an artwork, including its historical background, ideological concepts, values, and aesthetic pursuits. These give the artwork its soul, elevating it beyond aesthetic form to a level of spiritual resonance. The essence of art lies in expressing human emotions and thoughts, and only by deeply exploring a work's inner meanings can it possess lasting vitality. Thus, an artwork's value depends not only on its outward beauty but also on its cultural connotations and spiritual significance. By thoroughly exploring the cultural connotations of *Silk Road Flower Rain*, such as religious beliefs, historical context, and ethnic characteristics, its artistic expressiveness, appeal, and value can be enhanced.

The aesthetician Zhu (1984) once said, “Since art is a creation, it requires creative imagination. Creative imagination is not creating from nothing but rather reassembling existing imagery.” Artistic innovation is not a denial of tradition; it involves creative transformation of artistic forms and content based on respect for and inheritance of tradition while aligning with contemporary characteristics and aesthetic trends. This type of innovation not only breathes new life into traditional art but also enables it to shine anew in contemporary society, gaining broader dissemination and acceptance.

Hofstede's cultural dimensions theory (Hofstede, 2001) helps to understand the complexities of innovation management within different cultural contexts. Cultural innovation is the essence of inheriting and developing Dunhuang music and dance. In this inheritance process, it is essential to explore the cultural connotations and artistic value of Dunhuang music and dance,

integrating them with modern cultural elements to create works that are more contemporary and appealing. For example, by combining Dunhuang music and dance with modern musical elements, we can create innovative musical pieces that reflect Dunhuang culture. At the same time, integrating Dunhuang music and dance with modern dance elements allows for the exploration of more diverse performance forms and styles. This fusion not only revitalizes the tradition but also broadens its audience reach, ensuring its relevance and resonance in today's artistic landscape.

As a significant hub for the spread of Buddhism to the East, Dunhuang has accumulated profound religious culture. Dunhuang music and dance are heavily influenced by Buddhist and multi-ethnic cultures. The vast arrays of musical and dance murals preserved in the Dunhuang caves depict scenes of Buddhist music and dance in religious rituals. Through the study of these murals and related texts, one can understand the influence of Buddhist doctrines and religious rituals on Dunhuang music and dance. This integration of religious connotations infuses Dunhuang music and dance with a mystical and solemn artistic atmosphere, enhancing the spiritual depth of the work (Duan, 1994, 2007). The preservation and inheritance of the cultural art of Dunhuang's Mogao Caves should transcend material preservation and reach a level of spiritual inheritance. While it is essential to pass on world cultural heritage intact to the next generation, the highest form of inheritance is not just material but also spiritual. World heritage sites should not only be tourist destinations but also places of cultural pilgrimage for the Chinese people and schools of national education (Fan, 2016, 2020).

The theory of cultural connotations and artistic expression posits that cultural connotations are the soul of an artwork, determining its depth and richness. The artistic value of *Silk Road Flower Rain* must achieve innovative development by blending modern elements with traditional inheritance. This theory emphasizes the dialectical unity between tradition and innovation. Traditional art forms the foundation of culture, containing a nation's historical memory and spiritual wealth. However, if art remains mere replication and imitation of tradition, it loses vitality and cannot meet the diverse aesthetic demands of contemporary society.

The creators of *Silk Road Flower Rain* conducted in-depth research on Dunhuang murals, drawing inspiration from them and transforming the static images of mural dance into dynamic stage performances. Through the dancers' exquisite techniques and graceful movements, audiences feel as if they are traveling through time, witnessing the dance scenes in ancient Dunhuang murals. This revival of mural dance elements not only allows audiences to appreciate the charm of ancient art but also provides future generations with new avenues for studying and inheriting Dunhuang mural art. Its artistic value is evident in various aspects, such as dance choreography, musical composition, costume design, and has established a foundation for the rapid development of Chinese dance and drama arts (Yang, 2024). By exploring the cultural connotations of *Silk Road Flower Rain*, artists can infuse the work with rich thoughts and emotions, enhancing its artistic appeal. When audiences appreciate the work, they can not only experience the visual and auditory beauty but also feel its profound cultural connotations, sparking emotional resonance. This deepening of cultural connotations raises the artistic value of *Silk Road Flower Rain*, aiding its inheritance and development in modern society.

Fan (2024) researched the relationship between university music and dance performances and social cultural inheritance, stressing that staging music and dance dramas on university campuses serves as both a captivating performance and a vital means of social cultural inheritance. It plays a role in preserving and promoting cultural values, historical memory, and social sentiment. Studies on the positive effect of social participation on traditional cultural inheritance indicate that active social participation can enhance traditional culture's social influence and recognition.

Research in aesthetic psychology shows that people's mental activities and patterns in the process of arts appreciation are influenced by various factors, including individual backgrounds, emotional responses, and cultural contexts, which shape how they perceive and interpret artistic works. This understanding helps illuminate the cognitive and emotional processes involved in experiencing art, highlighting the complex interplay between personal experience interpretation and the intrinsic qualities of the artwork itself (Fenner, 2003; John, 2010; Lutfi, 2020). Through artistic innovation, *Silk Road Flower Rain* can meet contemporary audiences' aesthetic needs, increase their interest and identification with the work, and thus promote its inheritance and development. Artistic innovation bridges the gap between tradition and contemporary audiences' aesthetic preferences. By incorporating modern artistic elements into *Silk Road Flower Rain*, such as new choreography, modern musical elements, and stage visuals, it aligns more closely with current aesthetic trends. For example, multimedia technology and stage effects can enhance the visual impact of the performance, while incorporating electronic music elements into the

music enriches the auditory experience.

The musical and dance elements in Dunhuang murals are treasures of ancient Chinese art, featuring diverse and graceful dance figures. With exquisite dance, beautiful music, sophisticated stage design, and unique costume design, *Silk Road Flower Rain* demonstrates remarkable artistic value. It is not only a classic of Chinese ethnic dance drama but also a treasure of global dance art. With its unique artistic style and expressiveness, *Silk Road Flower Rain* is hailed as the “model of Chinese ethnic dance drama,” having a profound impact on the development of Chinese dance arts. In the future, this dance drama will continue to captivate and touch audiences with its distinctive artistic charm.

Silk Road Flower Rain serves as a cultural exchange emblem of Chinese music and dance arts, with its profound social connotations and exceptional artistic quality making significant contributions to China’s societal development. Their outstanding performance on the international stage foster friendships and cooperation between China and other countries, enhancing the international influence of Chinese culture, and is irreplaceable in advancing the globalization of Chinese arts.

The analysis above shows that artistic innovation and cultural connotations are crucial to the artistic value of *Silk Road Flower Rain* in its inheritance and development. This study will empirically test this hypothesis in subsequent chapters through case analysis to provide scientific evidence and practical guidance for enhancing the artistic value of Dunhuang music and dance of *Silk Road Flower Rain*.

3 Evaluation methodology

To comprehensively evaluate the inheritance effects of *Silk Road Flower Rain*, quantitative methods such as survey questionnaires, respondents evaluations, statistical analysis, are employed.

Delphi Method: Using Likert scales (*e.g.*, 1 to 5 points) to assess respondents’ views and evaluations on each indicator. Inviting respondents in related fields to conduct multiple rounds of anonymous evaluations and feedback, eventually reaching a consensus to form a quantitative assessment of the various values of *Silk Road Flower Rain*.

Artistic Value: Indicators such as artistic expression, innovation, and artistic evaluation scores.

3.1 Questionnaire design

To comprehensively evaluate the artistic value of *Silk Road Flower Rain*, we designed a detailed multi-value assessment questionnaire that encompasses various specific indicators. This questionnaire provides data support for the quantitative analysis of these indicators. [Table 1](#) shows the structure of the questionnaire and the survey indicators for each value dimension; the questionnaire is also divided into five levels: 1, 2, 3, 4, and 5, respondents only need to select the level they agree with.

Table 1 Artistic Value Survey

Artistic Value of <i>Silk Road Flower Rain</i>	1	2	3	4	5
(1) How do you rate the level of music composition in <i>Silk Road Flower Rain</i> ?					
(2) How well do you think <i>Silk Road Flower Rain</i> performs in terms of artistic innovation?					
(3) How do you think <i>Silk Road Flower Rain</i> performs in emotional expression?					
(4) How do you rate the cultural depth conveyed by <i>Silk Road Flower Rain</i> ?					
(5) How do you rate the costume design in <i>Silk Road Flower Rain</i> ?					
(6) How do you rate the stage design in <i>Silk Road Flower Rain</i> ?					
(7) How do you rate the technical execution in <i>Silk Road Flower Rain</i> ?					
(8) How do you rate the overall visual appeal of <i>Silk Road Flower Rain</i> ?					

We distributed this survey questionnaire to 60 respondents, including arts teachers of university (20 persons), artist (20 persons) and general arts workers (20 persons), to ensure its validity and accuracy, after receiving 42 completed questionnaires, in which, arts teachers of university (15 persons), artist (13 persons) and general arts workers (14 persons), we randomly selected 30 for sample analysis.

3.2 Data collection

We collect data through online questionnaires and on-site surveys, then clean and organize the collected data, addressing missing and abnormal values. Descriptive statistics, factor analysis,

and other methods are used to analyze the data, calculate scores and weights for each indicator, and conduct quantitative analysis.

The design of the questionnaire tables aims to evaluate *Silk Road Flower Rain* from multiple dimensions and indicators, providing a comprehensive analysis of its various aspects. By collecting specific feedback and ratings from respondents, the survey facilitates quantitative analysis and thorough evaluation. Furthermore, by considering media coverage and reviews of *Silk Road Flower Rain*, as well as its role in cultural exchanges and tourism promotion, we can assess the overall social impact of the transmission activities.

3.3 Artistic value evaluation

We randomly selected 30 samples to evaluate the 8 questions (indicators) in Table 1, and the scores were calculated based on these ratings. The analytical hierarchy process (Saaty, 1980; Zhang et al., 1996) is used to evaluate the artistic value evaluation in the inheritance and development of Dunhuang music and dance. The choice of the method is based on the strong comprehensiveness of the analytic hierarchy process (AHP), which can quantify qualitative indicators and is suitable for comprehensive evaluation of multiple indicators. The structure is clear. By building a hierarchical structure, complex problems are decomposed into different levels of criteria for easy analysis. At the same time, it also has strong operability.

3.3.1 Analytic hierarchy application design

To enhance clarity and operability, we provide detailed descriptions of the evaluation dimensions and weight allocation methods for each of the eight art indicators. We consider the artistic value of *Silk Road Flower Rain* as the target layer, while the levels of music creation (metric), artistic innovation, and emotional expression serve as the criterion layers. A hierarchical structure model is established (Figure 1).

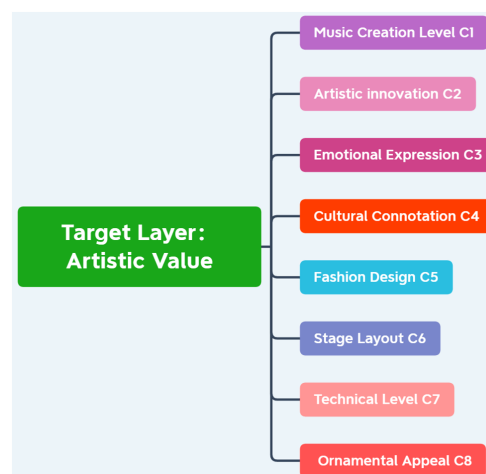


Figure 1 AHP Hierarchical Structure

In order to make each indicator clearer, we need to describe in detail the meaning of each indicator and explain the consistency of the 8 questions in the questionnaire with the 8 evaluation indicators. Here is a detailed description of each indicator.

(1) Music Creation Level (C1)

The level of music creation refers to the originality and complexity of the music in Dunhuang music and dance, as well as the compatibility of the dance movements. This includes the artistry and innovation found in composition, arrangement, harmony, and melody. It demonstrates how music supports dance expression and enhances emotional transmission. The evaluation dimensions include the originality and innovation of the music, the compatibility of music and dance movements, the complexity and layering of the music, and the ability to express musical emotions.

(2) Artistic Innovation (C2)

Artistic innovation pertains to the degree of originality in dance movements, performance forms, and stage design within Dunhuang music and dance. It evaluates how a work can introduce new creativity and expression while maintaining tradition, thereby breaking traditional boundaries and forming new artistic styles. The evaluation dimensions consist of the novelty

of dance movements and expressions, the innovation of stage design and visual effects, the integration of cross-disciplinary art (such as the combination of dance with other art forms), and breakthroughs in artistic expression.

(3) Emotional Expression (C3)

Emotional expression refers to the depth of emotion conveyed by actors through body language and facial expressions in dance, as well as the impact of this emotional transmission on the audience. The depth and authenticity of emotional expression directly affect the audience's emotional resonance. The evaluation dimensions include the sincerity and depth of emotional expression, the level of emotional transmission (such as the diverse presentation of emotions like sadness and joy), the coordination between emotions and dance movements, and the audience's emotional response and resonance.

(4) Cultural Connotation (C4)

Cultural connotation refers to the cultural value, historical background, national spirit, and ideological significance contained within Dunhuang music and dance. This evaluation examines how works preserve and convey the core concepts and historical spirit of Dunhuang culture through modern artistic expression. The evaluation dimensions include the expression of cultural symbols and historical background, the integration and transmission of cultural elements (such as traditional stories and historical contexts), the enhancement of the audience's cultural identity, and the connection between cultural connotation and artistic form.

(5) Fashion Design (C5)

Costume design refers to the creation of costumes in Dunhuang music and dance, focusing on their aesthetic effect, cultural symbolism, historical significance, and compatibility with dance performance. This includes how aspects such as color, style, and material align with the theme and emotional transmission of the work. The evaluation dimensions encompass the aesthetic effect and artistry of costume design, the functional relationship between costumes and dance performance (including factors like comfort and flexibility), the expression of cultural symbols and historical elements, and the compatibility of costumes with emotional expression.

(6) Stage Layout (C6)

Stage layout refers to the design and arrangement of the stage, including the background, lighting, props, and special effects. It examines how stage design can enhance the visual effects, emotional expression, and overall atmosphere of the performance. The evaluation dimensions involve the innovation and visual impact of stage design, the emotional synchronization of lighting and background, the effective use of props and special effects, and the coordination between the stage and dance movements.

(7) Technical Level (C7)

Technical level refers to the performance skills and technical precision demonstrated in Dunhuang music and dance. This encompasses the accuracy of dance movements, the execution of stage special effects, and the professional skills of the performers. The evaluation gauges whether the performance meets established professional standards. The evaluation dimensions include the accuracy and complexity of dance movements, the professionalism and skill level of performers, the execution of staging techniques (such as lighting and sound effects), and the fluidity and coordination of the overall performance.

(8) Ornamental Appeal (C8)

Ornamental appeal refers to the overall visual and auditory allure of Dunhuang music and dance. It encompasses the comprehensive effects of dance, music, costumes, and stage arrangements, evaluating whether the performance can capture the audience's attention and provide a delightful viewing experience. The evaluation dimensions include the visual and auditory coordination between dance and music, the appeal of stage setups and costume designs, the rhythm and fluidity of the performance, and the audience's emotional engagement and overall viewing experience.

3.3.2 Construction of the judgement matrix

The AHP specifies the scaling rules in the judgement matrix (Table 2; Saaty, T.L. 1980). The judgement matrix should be symmetric, satisfying the condition of $A_{ij}=1/A_{ji}$. If $A_{12}=3$, then A_{21} should be its reciprocal, *i.e.* $A_{21}=1/3$.

According to Table 2, the judgement matrix of *Silk Road Flower Rain* is an 8×8 matrix. Each element A_{ij} in the matrix represents the importance of i -th indicator relative to the j -th

Table 2 AHP scale rules for establishing the judgement matrix

Scale A_{ij}	Definition of the Rule
1	Indicates that Criteria C_i and C_j have the same influence (equally important).
3	Indicates that Criteria C_i is slightly more important than C_j (somewhat important).
5	Indicates that Criteria C_i is more important than C_j (important).
7	Indicates that Criteria C_i is significantly more important than C_j (very important).
9	Indicates that Criteria C_i is extremely more important than C_j (absolutely important).
2, 4, 6, 8	Represents intermediate values between the two adjacent main levels, used to express the degree of difference.
1/2, 1/3...1/9	Reciprocal values, representing the influence of C_j to C_i as reciprocal to A_{ij} .

indicator. These 8 indicators are compared in pairs and given corresponding weights according to the rules of Table 2. Make sure that the relative importance of each indicator in artistic value is reflected. If you think that artistic innovation has a higher weight in the overall artistic value, assign it a larger value in the judgement matrix, preferably 5, and take 3 if it is slightly higher; while music creation may be relatively low, assign it a smaller value (such as 1/3)

Based on the respondents' ratings, a judgement matrix can be constructed using the average scores for each criterion. This involves forming an 8×8 matrix. The formula to construct this matrix is:

$$A_{ij} = \frac{\bar{X}_i}{\bar{X}_j} \tag{1}$$

Where, A_{ij} represents the element in the matrix corresponding to the relative importance of criterion i compared to criterion j . \bar{X}_i, \bar{X}_j Average Score of Criterion i and Average Score of Criterion j are the mean values obtained from respondents ratings for criteria i and j respectively.

To calculate the judgement matrix using the AHP and based on the average scores provided by respondents for the eight evaluation criteria, we construct the matrix as follows. Each element in the matrix, A_{ij} , will represent the ratio of the average score of criterion i to the average score of criterion j . Table 3 shows the mean scores of respondents ratings for evaluation criteria.

Table 3 Mean scores of respondents ratings

Evaluation Criterion	Mean Score \bar{X}
C1 (Music Creation Level)	4.00
C2 (Artistic Innovation)	3.50
C3 (Emotional Expressiveness)	3.33
C4 (Cultural Connotation)	3.53
C5 (Fashion Design)	3.10
C6 (Stage layout)	3.03
C7 (Technical Level)	2.77
C8 (Ornamental Appeal)	2.70

This article establishes the judgement matrix as follows (Table 4) by using the scale rules provided by AHP combined with the average value of respondents scoring:

Table 4 Judgement Matrix

	C1	C2	C3	C4	C5	C6	C7	C8
C1	1	1	3	1	3	3	3	3
C2	1	1	1	1	1	1	3	3
C3	1/3	1	1	1	1	1	3	3
C4	1	1	1	1	1	1	3	3
C5	1/3	1	1	1	1	1	1	1
C6	1/3	1	1	1	1	1	1	1
C7	1/3	1/3	1/3	1/3	1	1	1	1
C8	1/3	1/3	1/3	1/3	1	1	1	1

3.3.3 Calculate the weight vector

The normalized matrix is achieved by dividing each element in the judgement matrix by the sum of its column. The formula is:

$$N_{ij} = \frac{A_{ij}}{\sum_{k=1}^n A_{kj}} \tag{2}$$

Where, A_{ij} is the element in the judgement matrix, and n is the dimension of the matrix. The result of the normalized matrix is as follows (Table 5).

Table 5 Normalized Matrix

	C1	C2	C3	C4	C5	C6	C7	C8
C1	0.214	0.15	0.346	0.15	0.3	0.3	0.188	0.188
C2	0.214	0.15	0.115	0.15	0.1	0.1	0.188	0.188
C3	0.071	0.15	0.115	0.15	0.1	0.1	0.188	0.188
C4	0.214	0.15	0.115	0.15	0.1	0.1	0.188	0.188
C5	0.071	0.15	0.115	0.15	0.1	0.1	0.063	0.063
C6	0.071	0.15	0.115	0.15	0.1	0.1	0.063	0.063
C7	0.071	0.05	0.039	0.05	0.1	0.1	0.063	0.063
C8	0.071	0.05	0.039	0.05	0.1	0.1	0.063	0.063

The calculation of the weight vector is obtained by normalizing the average value of each row of the matrix. The formula is:

$$w_i = \frac{1}{n} \sum_{j=1}^n N_{ij} \tag{3}$$

Where, w_i is the weight for the i -th evaluation criterion, and n is the number of evaluation criteria. The calculated weight vector is provided below (Table 6).

Table 6 Weight vector

Evaluation Criterion	Weight w
C1	0.229
C2	0.151
C3	0.133
C4	0.151
C5	0.102
C6	0.101
C7	0.067
C8	0.066

3.3.4 Consistency check

A consistency check is performed to ensure the consistency of the judgement matrix. Calculate the following values:

(1) Calculate the weighted sum vector

Obtain the weighted sum vector by multiplying the judgement matrix with the weight vector: Weighted sum vector = Judgement matrix \times Weight vector, the formula is:

$$C_i = \sum_{j=1}^n A_{ij}w_j \tag{4}$$

$$\begin{aligned} C_1 &= (Aw)_i \\ &= A_{11}w_1 + A_{12}w_2 + A_{13}w_3 + A_{14}w_4 + A_{15}w_5 + A_{16}w_6 + A_{17}w_7 + A_{18}w_8 \\ &= 1 \times 0.229 + 1 \times 0.151 + 3 \times 0.133 + 1 \times 0.151 + 3 \times 0.102 + 3 \times 0.101 + \\ &\quad 3 \times 0.067 + 3 \times 0.066 \\ &= 1.938 \end{aligned}$$

Calculate the ratio of each element in the weighted sum vector to the corresponding element in the weight vector, eigenvalue formula:

$$\begin{aligned} \lambda_i &= \frac{C_i}{w_i} \\ \lambda_1 &= \frac{C_1}{w_1} = \frac{1.938}{0.229} = 8.463 \end{aligned} \tag{5}$$

Weighted sum vector is shown in Table 7.

Table 7 Weighted sum vector

Evaluation Criterion	Weighted Sum Vector
C1	1.938
C2	1.266
C3	1.113
C4	1.266
C5	0.847
C6	0.847
C7	0.557
C8	0.557

Using the above formula, the eigenvector of the 8 indicators was calculated (Table 8).

Table 8 Eigenvector

Evaluation Criterion	Weighted Sum Vector C_i	Weight w_i	Eigenvalues λ_i
C1	1.938	0.229	8.463
C2	1.266	0.151	8.384
C3	1.113	0.133	8.368
C4	1.266	0.151	8.384
C5	0.847	0.102	8.304
C6	0.847	0.101	8.386
C7	0.557	0.067	8.313
C8	0.557	0.066	8.439

(2) Calculate the maximum eigenvalue λ_{max}

By obtaining the average of the ratios of the weighted sum vector to the weight vector, we obtain the maximum eigenvalue, denoted as λ_{max} .

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \frac{C_i}{w_i} = \frac{1}{n} \sum_{i=1}^n \lambda_i \tag{6}$$

Where, C_i is the elements in the weighted sum vector matrix; n is the dimension of the matrix; w_i is weight vector; λ_{max} is the maximum eigenvalue. It is obtained based on Equation (6). $\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \frac{C_i}{w_i} = \frac{1}{n} \sum_{i=1}^n \lambda_i = (8.463 + 8.384 + 8.368 + 8.384 + 8.304 + 8.386 + 8.313 + 8.439)/8 = 8.380$.

(3) Calculate Consistency Index (CI)

$$CI = \frac{\lambda_{max} - n}{n - 1} = \frac{8.380 - 8}{8 - 1} = 0.054 \tag{7}$$

(4) Calculate the Consistency Ratio (CR)

$$CR = \frac{CI}{RI} = \frac{0.054}{1.41} = 0.039 \tag{8}$$

Saaty (1980) conducted extensive experiments on random matrices ranging from 1 to 15 dimensions and obtained the following table of random consistency indices, with the RI for an 8-dimensional matrix being found to be 1.41. If the CR value is less than 0.1, the consistency of the matrix can be considered acceptable.

(5) Calculate the composite score using weights and ratings

$$\begin{aligned} \text{Artistic Value} &= C_1w_1 + C_2w_2 + C_3w_3 + C_4w_4 + C_5w_5 + C_6w_6 + C_7w_7 + C_8w_8 \\ &= 4.00 \times 0.229 + 3.50 \times 0.151 + 3.333 \times 0.133 + 3.533 \times 0.151 + \\ &\quad 3.100 \times 0.102 + 3.033 \times 0.102 + 2.767 \times 0.067 + 2.700 \times 0.066 \\ &= 3.407 \end{aligned} \tag{9}$$

Based on the weights determined by AHP and the scores of each indicator, the comprehensive artistic value score of *Silk Road Flower Rain* is 3.407 out of 5, indicating a high level of artistic value.

4 Results and discussion analysis

Silk Road Flower Rain is a Dunhuang music and dance production that integrates music, dance, costume, and cultural connotations. Its artistic value is influenced by multiple factors. The following is a specific analysis of the impact of 8 indicators on its artistic value. Combining the data from Table 3 (average respondents scores) and Table 6 (AHP-derived weights), we can analyze the differences and consistencies between the respondents scores and the weights assigned to various evaluation criteria for the artistic work *Silk Road Flower Rain*. This analysis will help in understanding the relative importance of different evaluation indicators in assessing the artistic value of the work. We summarize the data presented in Table 9.

Table 9 Respondents scores and AHP weights

Evaluation Indicator	Average Score	Weight (w)
Music Creation Level (C1)	4.00	0.229
Artistic Innovation (C2)	3.50	0.151
Emotional Expressiveness (C3)	3.33	0.133
Cultural Connotation (C4)	3.53	0.151
Fashion Design (C5)	3.10	0.102
Stage Layout (C6)	3.03	0.101
Technical Level (C7)	2.77	0.067
Ornamental Appeal (C8)	2.70	0.066

4.1 Evaluation of AHP weights for artistic value

The music creation level (C1) has the greatest impact on the artistic value of *Silk Road Flower Rain*, accounting for approximately 22.94%. This is because music plays a central role in dance performances; it is not just a backdrop but also an essential medium for emotional expression that can directly influence the audience's experience.

Artistic innovation (C2) and cultural connotation (C4) each account for 15.06%. Innovation is a key factor in evaluating artistic value, particularly in contemporary performing arts. In works like *Silk Road Flower Rain*, innovation brings new experiences, enhancing the uniqueness and appeal of the production. This reflects the work's incorporation of modern artistic techniques while retaining the characteristics of traditional dance drama. The addition of innovative elements breathes new life into the production, showcasing a more diverse artistic expression rooted in traditional culture. Cultural connotation is also an important influencing factor; *Silk Road Flower Rain* is deeply embedded in cultural history, and its cultural connotations add significant artistic value by portraying the historical context of the Silk Road and cultural exchanges. This demonstrates the cultural depth and artistic expression of *Silk Road Flower Rain* as a historical and cultural dance drama.

Emotional expression (C3) accounts for 13.27%. Although C3's weight is slightly lower than that of C2 and C4, it still has a significant impact. This indicator relates to the professionalism of the performers and the precision of dance movements, which can enhance the audience's visual experience and appreciation of the art. Emotional expression directly affects the audience's emotional resonance with the performance. The dance, music, and performances effectively convey cultural connotations and artistic themes to the audience. The production excels in capturing emotions, using the combination of dance movements and music to vividly portray the characters' feelings, especially during key plot moments. This indicates that emotional expressiveness plays an essential role in artistic value. The alignment between the dancers' movements, facial expressions, and the music determines the strength of the audience's emotional connection. While emotional expressiveness scores slightly lower than innovation, it significantly contributes to the artistic appeal of the work, directly influencing the audience's aesthetic experience.

Fashion design (C5) and stage layout (C6) each account for 10.15%. Both indicators have similar and moderately balanced weights. These elements serve as auxiliary components, such as stage scenery and costume design. Although they do not dominate the overall artistic value, they are crucial for enhancing stage performance and artistic appeal. Costumes not only contribute to visual aesthetics but also reflect historical and cultural backgrounds. They serve as supplementary visual elements that enrich stage effects and enhance the performance of dance movements, despite their relatively weaker direct impact compared to music and emotional expression. Stage set design directly influences the overall artistic effect but is less significant than core elements like music, innovation, and emotional expression. While stage scenery is important in shaping visual effects, it is not a key determinant of artistic value; rather, it supports

the core elements of dance and music, improving the overall viewing experience.

Technical level (C7) and ornamental appeal (C8) each account for 6.69%. Technical proficiency significantly influences the overall artistic performance, accounting for 3.9%. The technical proficiency of dance, music, lighting, and stagecraft directly affects the audience's viewing experience. High levels of technical performance can enhance the artistic appeal of the work. However, for *Silk Road Flower Rain*, technical proficiency is not the primary determinant of its artistic value. While it ensures the quality of the performance, the artistry is predominantly reflected in emotional conveyance and cultural expression. Appeal mainly refers to the attractiveness and entertainment value of the performance, which relates to factors like technical proficiency and emotional expression, but it more directly affects the audience's sensory experience. This indicates that while appeal is important, it largely results from the overall performance of other aspects of the work. The enhancement of appeal relies on the combined effects of factors such as music and emotional expression. Although appeal directly affects the audience's experience, it essentially reflects the performance in these other areas.

Ultimately, the combined effect of these eight indicators makes *Silk Road Flower Rain* not only a dance drama with historical depth but also an artwork that incorporates modern aesthetic innovations. Each indicator enhances the audience's experience at different levels, ensuring the overall artistic value of the work. Artistic innovation (C2) also has a significant weight (11.62%). It allows *Silk Road Flower Rain* to retain traditional cultural characteristics while incorporating modern aesthetics, making it attractive to a broad audience, especially younger viewers. Innovation drives continuous breakthroughs in artistic performance, maintaining freshness and vitality.

4.2 Consistency between scores and weights

4.2.1 High scores with high weights

The indicator C1 (Music Creation Level) received the highest average score of 4.00, corresponding to the highest weight of 0.229. This indicates that respondents generally believe that music creation level is critical in the overall assessment of artistic value. The alignment of high scores with high weights suggests a consensus among the respondents regarding the significance of this indicator.

4.2.2 Moderate scores and weights consistency

Indicators C2 (Artistic Innovation) and C4 (Cultural Connotation) received moderate average scores of 3.50 and 3.53, respectively, with weights of 0.151. The similarity in scores and weights indicates a consistent view among respondents regarding the importance of artistic innovation and cultural connotation.

4.2.3 Lower scores and weights consistency

In contrast, indicators C7 (Technical Level) and C8 (Ornamental Appeal) received the lowest average scores of 2.77 and 2.70, respectively, along with the lowest weights of 0.067 and 0.066. This reflects a consensus among respondents that these aspects are relatively less critical in evaluating the artistic value of *Silk Road Flower Rain*.

4.3 Analysis of differences

4.3.1 Lower scoring indicators

Although C5 (Costume Design) and C6 (Stage Layout) scored higher than C7 and C8 with average scores of 3.10 and 3.03, their relative importance remains lower compared to music creation, artistic innovation, and cultural connotation. This suggests that both respondents and viewers may prioritize content and emotional expression over purely visual or technical elements when considering artistic value.

4.3.2 Differences in scores and weights

In Artistic innovation (C2) and cultural connotation (C4), despite C4's higher score compared to C2, both maintain the same weight. This consistency indicates that respondents possess a uniform perspective regarding the significance of these dimensions, even if there are subtle differences in their scoring. Understanding these nuances is crucial for comprehending the overall valuation of the artistic work.

Overall, the above analysis validates the rationale of Hypothesis 4, which states that artistic in-

novation and cultural connotation influence the artistic value of the inheritance and development of *Silk Road Flower Rain*.

5 Conclusions

By combining the weights and scores of the indicators, the comprehensive artistic value score of the *Silk Road Flower Rain* dance drama is calculated to be 3.407. This score represents the weighted outcome of all indicators, reflecting the overall artistic expression of the dance drama.

The optimized consistency ratio (CR) of the judgement matrix is 0.039, which is less than 0.1, indicating good consistency of the judgement matrix and that the evaluation results are reliable. This shows that the respondents' judgement on the importance of each indicator is relatively consistent, giving the final weights and scores high credibility.

In terms of artistic value, the analytic hierarchy process (AHP) model indicates that C1, C2, and C4 are key factors affecting the artistic value of *Silk Road Flower Rain*, which involve core elements of artistic expression such as music, emotional conveyance, and narrative coherence—key aspects in enhancing the artistic value of the entire performance. While C7 and C8 have lower weights, they provide important support for improving the overall experience as auxiliary elements. Therefore, to further enhance the artistic value of *Silk Road Flower Rain*, it is advisable to prioritize strengthening the core expressiveness of C1 while also recognizing the improvement potential in C2 and C4.

The analysis of the differences and consistencies between the average respondents' scores and the weights derived from AHP reflects a consensus on the significance of different evaluation indicators in assessing artistic value. The high scores and corresponding weights for certain indicators emphasize their dominant role in evaluating the artistic work, while lower scores and weights indicate aspects that are relatively less important. This analysis provides important insights for future assessments of artistic works like *Silk Road Flower Rain*, helping to deepen the understanding of the elements that contribute to artistic value. These weight vectors represent the relative importance of each indicator in the overall artistic value evaluation.

The main contribution of this paper is the innovative application of the analytic hierarchy process to evaluate the value of an artistic work like *Silk Road Flower Rain* from eight different aspects. This approach has determined the relative importance of the eight indicators in the overall assessment of artistic value, providing a reference method that combines quantitative and qualitative evaluations for other researchers assessing the artistic value of literary and artistic works.

Conflicts of interest

The authors declare that they have no conflict of interest.

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